

### **REMARKS**

The Final Office Action of November 13, 2003 has been considered by the Applicants. Withdrawal of the rejections and issuance of a Notice of Allowance is requested.

The Examiner has rejected claims 6 through 15 under 35 U.S.C. § 112, first paragraph, as failing to comply with the enabling requirement. Applicants traverse the rejection.

According to the Examiner, it is not possible to have a number of (I), (II), and (D) formulas claimed and somehow obtain a  $M_n$  of from about 2000 to about 100,000. Applicants initially note that the claim includes a  $M_n$  of from about 4000 to about 50,000, but recognize the Examiner would renew the rejection based on this  $M_n$  range. Applicants submit that the claimed molecular weight is achievable utilizing the claimed (I), (II), and (D) formulas, because the claim refers to monomer segments, and one skilled in the art would recognize the number of monomer segments necessary to achieve the claimed molecular weight. Accordingly, the claims are enabling and Applicants request withdrawal of the rejections.

Claims 8-10 and 16-34 are rejected under 35 U.S.C. § 112, second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention. The rejection is traversed.

According to the Examiner, it is unclear whether D is present in claims 8-10, 17, 18, 26, and 27. Applicants submit that the claim language makes it clear that the number of D linkages is 1. It is therefore clear that D is present and Applicants request withdrawal of the rejection.

With respect to claim 16, the Examiner states that it is unclear what values m and c may have. The claim has been clarified to more fully define the values of m and c.

Claim 17 has been clarified to improve the language of the Markush group.

Applicants submit the claims are not indefinite, as alleged by the Examiner, and request withdrawal of the 35 U.S.C. § 112, second paragraph rejections.

Claims 6-10, 13, 14, and 17 are rejected under 35 U.S.C. § 102(b) as being anticipated by Garnier. Applicants traverse.

According to the Examiner, Garnier discloses a thin film transistor, comprising a substrate, gate electrode, gate dielectric, and source/drain electrodes and a semiconductor layer comprising a polythiophene derived from monomer segments. The Examiner further states that while Garnier teaches against using molecular weights greater than about 2000, that molecular weight overlaps with the presently claimed molecular weight. Applicants disagree. The present claims recite a  $M_n$  of from about 4,000 to about 50,000. The Examiner has not shown where Garnier discloses a  $M_n$  within the presently claimed molecular weight. Moreover, Applicants submit that Garnier clearly teaches away from utilizing a  $M_n$  within the presently claimed range. Because Garnier does not disclose every element of the claimed device, Garnier cannot be said to be anticipatory of the present claims. Accordingly, withdrawal of the rejections is requested.

The Examiner has rejected claims 6-10, 13, 14, and 17 under 35 U.S.C. § 102(e) as being anticipated by Bao. The rejection is traversed.

According to the Examiner, Bao discloses a thin film transistor device comprised of a substrate, a gate electrode, a gate dielectric layer, a source electrode and a drain electrode, and a semiconductor layer comprised of a polythiophene derived from a monomer segment or monomer segments containing two 2,5-thienylene segments and a the number of divalent linkages D is 0. Bao does not disclose the use of divalent linkage D, unlike present claim 6, which states that D is equal to 1. Because Bao does not disclose every element of the present claims, it cannot be said to be anticipatory of the present claims. Accordingly, withdrawal of the rejections is appropriate.

Claims 16-21, 28-31, and 35-37 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Garnier in view of Reed. Applicants traverse the rejection.

The Examiner states that Garnier discloses each of the features of the claimed TFT, except the third monomeric unit having the B sidechain which is required to be present in claimed formula. Reed, according to the Examiner, teaches polythiophenes for electrical applications and teaches the instantly claimed central thiophene monomers in the oligomer having an even number or odd number of the B side chain, wherein B is hydrogen. The Examiner states that it would have been obvious for one of ordinary skill in the art, at the time of

the invention to provide central monomers in the oligothiophene having the hydrogen in the central portion of the Garnier oligomer, in order to provide further control of the conductivity and properties of the channel region of the TFT. Applicants disagree.

The Examiner has not shown where either of Garnier or Reed teaches or suggests the use of polythiophenes having a  $M_n$  of from about 4000 to about 50,000. Moreover, the Examiner has provided no motivation that would lead one of skill in the art to utilize a  $M_n$  of from about 4000 to about 50,000, in light of Garnier's express teaching against the use of molecular weights greater than about 2000 and Garnier's express requirement for the use of oligomers, not polymers. The Examiner has alluded to this distinction by referencing the Garnier oligomers in his rejection. Applicants submit it would not be obvious to ignore the express teachings of Garnier by using polythiophenes having a  $M_n$  of from about 4000 to about 50,000 such as those presently claimed. Accordingly, withdrawal of the 35 U.S.C. § 103(a) rejections is requested.

The Examiner has rejected claims 23 and 24 under 35 U.S.C. § 103(a) as being unpatentable over Garnier in view of Reed and further in view of Sato. The rejection is traversed.

According to the Examiner, Garnier and Reed disclose each of the claimed features except for the number and weight average molecular weight ranges of the polythiophene. Sato teaches the production of electrically conductive polythiophenes such as those disclosed by the general formula (III) in Garnier, wherein the weight average molecular weight is between 60,000 and 100,000 which overlaps the instantly claimed ranges. The Examiner then states that it would have been obvious for one of ordinary skill in the art, at the time of the invention, to use the molecular weight for the polythiophene in view of Reed as that taught in Sato as a matter of routine optimization. Applicants disagree.

The Examiner has provided no motivation that would lead one of skill in the art to ignore the express teachings of Garnier that the number average molecular weight of the oligothiophenes should be no greater than about 2000. Garnier expressly teaches away from using larger molecular weights and expressly teaches the use of oligomers, not polymers. The Examiner has pointed to no teaching or suggestion in any of Garnier, Reed, or Sato that would overcome that express teaching. One skilled in the art would not, as a matter of

routine optimization, utilize the molecular weights of Sato, because Garnier expressly teaches away from using those molecular weights. It is not obvious to ignore direct teachings, and the proposed combination is thus not obvious. Applicants submit the Examiner would only find such a combination obvious through the use of prohibited hindsight, using the present application as a roadmap. Accordingly, Applicants submit the proposed combination is not obvious, because the motivation necessary to lead one of skill in the art to ignore the express teachings of Garnier is not provided. Withdrawal of the rejections is requested.

Claim 34 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Garnier in view of Reed, and further in view of Dodabalapur. The rejection is traversed.

According to the Examiner, Garnier discloses that the thickness of the gate dielectric is 0.5 to 10  $\mu\text{m}$  and the thickness of the polythiophene may be 20 to 200 nm which overlaps that instantly claimed. The Examiner further states that Garnier also teaches the thickness for the source/drain electrodes of 25 nm which is near that instantly claimed. The Examiner continues to state that Garnier in view of Reed does not teach that thickness of the substrate to be 10  $\mu\text{m}$  to 10 mm, but Dodabalapur teaches a TFT and method for forming having polythiophene as the semiconductor channel wherein the substrate is made from plastic and is 30 to 100  $\mu\text{m}$ . The Examiner alleges that it would have been obvious for one of ordinary skill in the art, at the time of the invention, to use the substrate thickness of Dodabalapur as the substrate thickness in Garnier in view of Reed, because Garnier is silent to the thickness of the plastic substrate such that one of ordinary skill would be motivated to use conveniently known thicknesses which are readily available and already used for TFTs such as those in Dodabalapur.

Even if the Examiner were correct that such a combination would be obvious, the proposed combination would not result in the presently claimed device. The Examiner has not pointed to any teaching or suggestion in any of the cited references that would lead one of skill in the art to make the proposed combination, and further modify that combination by incorporating a polythiophene having a  $M_n$  of from about 4000 to 50,000. Moreover, the Examiner has provided no motivation that would lead one of skill in the art to

ignore the express teachings of Garnier, that the molecular weight should be no greater than about 2000 and that oligomers are the preferred form of the polythiophene, to utilize the presently claimed polythiophenes. The Examiner has not met the burden of proving a prima facie case of obviousness, because no motivation has been provided that would render such a modification obvious. Accordingly, withdrawal of the 35 U.S.C. § 103(a) rejections is requested.

Claims 6-14, 16, 17, 18, 19, 22-27, and 32-33 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Tsumura in view of Sato. Applicants traverse.

The Examiner states that Tsumura discloses a thin film transistor device comprised of a substrate, a gate electrode, a gate dielectric layer, a source electrode and a drain electrode, and a semiconductor layer comprised of a polythiophene derived from a monomer segment or monomer segments containing two 2,5-thienylene segments (I) and (II), and an optional divalent linkage D. The Examiner states that Tsumura is silent to the molecular weight, but that Sato teaches a weight average molecular weight of 60,000 to 100,000. It would have been obvious for one of ordinary skill in the art, according to the Examiner, at the time of the invention to use the molecular weight of the Sato polythiophene as that of the polythiophene of Tsumura. Applicants disagree.

Even if the proposed combination were obvious, which Applicants submit it is not, the Examiner has not shown where either of Tsumura or Sato teaches or suggests the use of a divalent linkage, D, such as that presently claimed. Moreover, no motivation has been provided that would lead one of skill in the art to combine the references as suggested and then modify that combination by including a divalent linkage, D. Without such a modification, the proposed combination would not result in the presently claimed device. The required modification, in conjunction with the proposed combination, would only be obvious through the use of prohibited hindsight, using the present invention as a roadmap. Because the Examiner has provided no motivation for the modification required to achieve the present device, the claims cannot be said to be obvious. Withdrawal of the rejections is thus requested.

The Examiner has rejected claims 15 and 34 under 35 U.S.C. § 103(a) as being unpatentable over Tsumura in view of Sato and further in view of Dodabalapur. The rejections are traversed.

The Examiner states that Tsumura in view of Sato discloses each of the claimed features except for indicating that the gate, source, and drain electrodes are comprised of a conductive ink and the thicknesses of the material layers, but that Dodabalapur discloses that metal-containing polymer inks are beneficial to enable easier processing and teaches the thicknesses of the material layers.

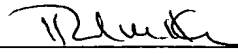
Applicants disagree that Tsumura in view of Sato discloses each of the claimed features. As discussed above, the Examiner has not shown where either of Tsumura or Sato teach or suggest the presence of divalent linkage D. The Examiner has also not shown that Dodabalapur remedies this omission. Accordingly, no motivation is provided that would lead one of skill in the art to combine the three references as suggested by the Examiner and then modify that combination to include the presently claimed divalent linkage. Without such motivation, the claims cannot be said to be obvious. Withdrawal of the rejections is therefore requested.

Applicants submit the present application is in condition for allowance. Withdrawal of the rejections and issuance of a Notice of Allowance is requested.

In the event the Examiner considers personal contact advantageous to the disposition of this case, he/she is hereby authorized to call Rick M. Klein, at telephone number 216-861-5582, Cleveland, OH.

It is believed that no fee is due in conjunction with this response. If, however, it is determined that fees are due, authorization is hereby given for deduction of those fees from Deposit Account No. 24-0037.

Respectfully submitted,  
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